Highway and Freeway encasement requirements for Transverse crossings of Utility installations, installed by the following methods. The pavement or roadway shall not be open-cut unless specifically allowed under a "UT" permit. Utility installations shall not be installed inside of culverts or drainage structures.

The installation of Uncased High Pressure Natural Gas pipelines is allowed, when in compliance with TR-0158 Special Provisions, "Exception to Policy" for Uncased High Pressure Natural Gas Pipelines.

Encasement Requirements for Transverse Crossings

	Bore and Jack		Directional Drilling		Trenching	
Facility Type	**Frwy/Expwy**	**Conventional**	**Frwy/Expwy**	**Conventional**	**Frwy/Expwy**	**Conventional**
High Risk (Section 605)	Encase	Encase	Encase	Encase	Encase	Encase
Low Risk (Section 605)	Encase	Encase	Encase	Encase	Encase	Optional
Exempt Facilities (Section 605)	Encase	Encase	Optional	Optional	Optional	Optional
Pressurized Fluids	Encase	Encase	Encase	Encase	Encase	Encase
Natural Gas Lines Minimum 7.5' Depth (Appendix H)	Optional	Optional	Encase	Encase	Optional	Optional
Gravity Flows	Encase	Encase	Encase	Encase	Optional	Optional

Note: "Optional" means at the option of the District Permit Engineer.

UG 1. CASINGS:

Casings' should be steel conduit with a minimum inside diameter sufficiently larger than the outside diameter of the pipe or ducts to accommodate placement and removal. The casing can be either new or used steel pipe, or an approved connector system. Used pipe shall be pre-approved by the Department's engineer or representative before installation.

When the method of Horizontal Directional Drilling is used to place casing, the use of High Density Polyethylene Pipe (HDPE) as casing is acceptable. Provided, that the use of a steel casing pipe could not conform to the bends of the proposed radii and in conjunction with the approval of Headquarters Office of Encroachment Permits.

A. All pipes 6" (152 mm) or larger in diameter, or placement of multiple pipes or ducts, regardless of diameters, shall require encasement.

B. Minimum wall thickness for steel pipe casing for different lengths and diameters of pipes are as follows:

Minimum Wall Thickness

Casing Pipe (Diameter)	**Up to 46 m** (Length)	**Over 46 m** (Length)
6" to 28" (152 mm to 711 mm)	1/4" (6 mm)	1/4" (6 mm)
30" to 38" (762 mm to 965 mm)	3/8" (10 mm)	1/2" (13 mm)
40" to 60" (102 mm to 1524 mm)	1/2" (13 mm)	3/4" (20 mm)
62" to 72" (1575 mm to 1829 mm)	3/4" (20 mm)	3/4" (20 mm)

C. Spiral welded casing is authorized provided the casing is new and the weld is smooth.

D. The ends of the casing shall be plugged with ungrouted bricks or other suitable material approved by the Department's' representative.

E. When required by the Department's representative, the permittee shall at his expense, pressure grout the area between the pavement and the casing from within the casing in order to fill any voids caused by the work covered under this permit. The increments for grout holes inside the pipe shall be 8' (2.43 m) staggered and located 22-1/2 degrees from vertical axis of the casing. Pressure shall not exceed 5 psig (34.47 kPa) for a duration sufficient to fill all voids.

F. The installation of multiple casings shall be installed with a minimum of 1-1/2 diameter clearance between casings, but not less than 18" (457 mm). The clearance between casings crossing freeways shall be two (2) diameters minimum, but not less than 24" (610 mm).

G. The casings placed within freeway right-of-way shall extend to the access control lines.

H. Wing cutters, if used, shall be a maximum of 1" (25 mm) larger than the casing. Voids caused by the use of wing cutters shall be grouted in accordance with "E" above.

I. A band welded to the leading edge of the casing should be placed square to the alignment. The band should not be placed on the bottom edge. Flaring the lead section on bores over 100' (30.48 m) shall not be permitted.

J. All casing lengths shall equal to the auger length.

K. The casings within conventional highways shall extend 5' (1.52 m) beyond the back of curb or edge of pavement, or to the right of way line if less. Where PCC cross-gutter exists, the casing shall extend at least 5' (1.52 m) beyond the back of the cross-gutter, or to the right of way line if less.

Bore and receiving pits shall be:

A. Located at least 10' (3.04 m) or more from the edge of pavement on conventional highways in rural areas.

B. Located 5' (1.52 m) behind the concrete curb or AC dike on conventional highways in urban areas.

C. Located 5' (1.52 m) outside the toe of slope of embankment areas.

D. Located outside freeway right of way.

E. Adequately fenced and/or have a Type-K barrier placed around them.

F. Adequately shored in accordance with Cal-OSHA requirements. Shoring for jacking and receiving pits located within 15' (4.57 m) of traffic lanes on a State highway shall not extend more than 36" (914 mm) above the pavement grade unless otherwise authorized by Department's representative. Reflectors shall be affixed to the shoring on the sides facing traffic. A 6' (1.82 m) chain link fence shall be installed around the perimeter of the pits during non-working hours.

G. All pits should have crushed-rock and sump areas to clear groundwater and water used to clean the casing. Where ground water is found and pumping is required, the pits shall be lined with filter fabric.

UG 2. DIRECTIONAL DRILLING:
Bore and Receiving Pits

When directional drilling is the approved method for pipe installation, drilling plans shall contain information listed as follows:

1. Location of: entry and exit point, access pit, equipment, and pipe staging area.
2. Proposed drill path alignment (horizontal and vertical).
3. Location and clearances of all other facilities.
4. Depth of cover.
5. Soil analysis.*
6. Carrier pipe length, diameter, thickness, and material (HDPE/steel) and ream pipe diameter.
7. Detailed carrier pipe calculations confirming ability to withstand installation loads and long term operational loads including H20.
8. Proposed drilling fluid composition, viscosity, and density (based on soils analysis).
9. Drilling fluid pumping capacity, pressures, and flow rates
10. State right-of-way lines, property, and utility right of way or easement lines.
11. Elevations.
12. Type of tracking method/system and accuracy used.
13. A detailed plan for monitoring ground surface movement (settlement or heave) resulting from the drilling operation.

* May be waived by the District Permit Engineer for HDD jobs less than 6" (150 mm) in diameter and a traverse crossing less than 150' (50 m).

UG 3. LIMIT OF EXCAVATION:

No excavation is allowed within 10' (3.04 m) from the edge of pavement except in curbed urban areas or as specified in the permit. Where no curb exists and excavations within 10' (3.04 m) of the traveled way are to remain open, a temporary Type-K railing shall be placed at a 20:1 taper or as otherwise directed by the Department.

UG 4. TUNNELING:

In addition to the requirements of **"UG1"** the following requirements apply:

A. For the purpose of this provision, a tunnel is defined as any pipe, 30" (762 mm) or larger in diameter.

B. When tunneling is authorized, the permittee shall provide full-time inspection of tunneling operations. The Department’s representative shall monitor projects.

C. A survey grid shall be set and appropriately checked over the centerline of the pipe jacking or tunneling operation. Copies of the survey notes shall be submitted to the Department's representative.

D. Sand shields may be required as ground conditions change.

E. The method used to check the grade and alignment shall be approved by the Department's representative.

F. Pressure grouting for liner plates, rib and spiling, or rib and lagging tunnels shall be at every 8' (2.43 m) section or at the end of work shift before the next section is excavated. All grouting shall be completed at the end of each workday.

G. A method for securing the headway at the end of each workday is required. Breastplates shall be installed during working hours for running sand or super-saturated soil.

UG 5. HIGH AND LOW RISK FACILITIES:

High and Low Risk Facilities, as defined in the Department's current Manual on High and Low Risk Underground Facilities, shall be installed with a minimum cover of 42" (1067 mm).

UG 6. EXEMPT AND OTHER UNDERGROUND FACILITIES:

A. Exempt Facilities:

1. Gas service lines no larger than 2" (51 mm) in diameter or operating at 413.7 kPa (60 PSIG) or less.
2. Underground electrical service conductors with a potential to ground of 300 volts or less.
3. Departmental owned electrical systems.

B. All facilities other than high and low risk shall have a minimum cover of 36" (914 mm) except for service connections, which shall have a minimum cover of 30" (762 mm).

UG 7. DETECTOR STRIP:

A continuous metallic detector strip shall be provided with non-metallic main installations. Service connections shall be installed at right angles to the centerline of the State highway where possible.

UG 8. BACKFILLING:

All backfilling shall conform to the applicable sections of the Department's Standard Specifications. Ponding or jetting methods of backfilling is prohibited.

Any required compaction tests shall be performed by a certified laboratory at no cost to the Department and the laboratory report furnished to the Department's representative.

UG 9. ROADWAY SURFACING AND BASE MATERIALS:

When the permit authorizes installation by the open cut method, surfacing and base materials and thickness thereof shall be as specified in the permit.

Temporary repairs to pavements shall be made and maintained upon completion of backfill until permanent repairs are made. Permanent repairs to pavements shall be made within thirty (30) days of completion of backfill unless otherwise specified

by the Department. Temporary pavement patches shall be placed and maintained in a smooth riding plane free of humps and/or depressions.

UG 10. DAMAGE TO TREE ROOTS:

No tree roots over 3" (76 mm) will be cut within the tree drip line when trenching or other underground work is necessary adjacent to roadside trees. The roots that are 3" (76 mm) or more in diameter inside the tree drip line shall be tunneled under and wrapped in burlap and kept moist until the trench is refilled. Trenching machines may not be used under trees if the trunk or limbs will be damaged by their use.

If the trees involved are close together and of such size that it is impractical to protect all roots over 3" (76 mm) in diameter, or when roots are less than 4" (102 mm) in diameter, outside tree drip line, special arrangements may be made whereby pruning of the tree tops to balance the root loss can be done by the permittee under the close supervision of the District Landscape Specialist or District Tree Maintenance Supervisor. Manholes shall not be installed within 20' (6.09 m) of any trunk.

UG 11. PIPES ALONG ROADWAY:

Pipes and conduits paralleling the pavement shall be located as shown on the plans or located outside of pavement as close as possible to the right-of-way line.

UG 12. BORROW AND WASTE:

Borrow and waste will be allowed within the work limits only as specified in the permit.

UG 13. MARKERS:

The permittee shall not place any markers that create a safety hazard for the traveling public or departmental employees.

UG 14. CATHODIC PROTECTION:

The permittee shall perform stray current interference tests on underground utilities under cathodic protection. The permittee shall notify the Department prior to the tests. The permittee shall perform any necessary corrective measures and advise the Department.

UG 15. TIE-BACKS:

A. Tie-backs shall be placed for the sole purpose of supporting shoring and/or soldier piles placed outside State highway rights-of-way to facilitate permittee's excavation.

B. Tiebacks shall be disconnected from the shoring and/or soldier piles one (1) year prior to releasing the bond.

UG 16. INSTALLATION BY OPEN CUT METHOD:

When the permit authorizes installation by the open cut method no more than one lane of the highway pavement shall be open-cut at any one time. Any exceptions shall be in writing by the Department's representative. After the pipe is placed in the open section, the trench is to be backfilled in accordance with specifications, temporary repairs made to the surfacing and that portion opened to traffic before the pavement is cut for the next section.

If, at the end of the working day, backfilling operations have not been properly completed, steel plate bridging shall be required to make the entire highway facility available to the traveling public in accordance with the Steel Plate Bridging Special Provisions (TR-0157)

UG 17. PAVEMENT REMOVAL:

PCC pavement to be removed shall be saw cut at a minimum depth of 4" (102 mm) to provide a neat and straight pavement break along both sides of the trench. AC pavement shall be saw cut to the full depth.

Where the edge of the trench is within 2' (0.60 m) of existing curb and gutter or pavement edge, the asphalt concrete pavement between the trench and the curb or pavement edge shall be removed.

UG 18. MAINTAIN ACCESS:

Where facilities exist (sidewalks, bike paths), a minimum width of 4' (1.21 m) shall be maintained at all times for safe pedestrian and bicyclist passage through the work area.

UG 19. SIDES OF OPEN-CUT TRENCHES:

Sides of open cut trenches in paved areas shall be kept as nearly vertical as possible. Trenches shall not be more the 2' (0.60 m) wider than the outside diameter of the pipe to be laid therein, plus the necessary width to accommodate shoring.

UG 20. EXCAVATION UNDER FACILITIES:

Where it is necessary to excavate under existing curb and gutter, or underground facilities, the void shall be backfilled with two (2) sack cement-sand slurry.

UG 21. PERMANENT REPAIRS TO PCC PAVEMENT:

Repairs to PCC pavement shall be made of Portland Cement Concrete containing a minimum of 298.46 kg (658 lbs. or 7 sack) of cement per cubic yard (0.91 cubic meter). Replaced PCC pavement shall equal existing pavement thickness. The concrete shall be satisfactorily cured and protected from disturbance for not less than forty-eight (48) hours. Where necessary to open the area to traffic, no more than two (2%) percent by weight of calcium chloride may be added to the mix and the road opened to traffic after six (6) hours.

UG 22. REMOVAL OF PCC SIDEWALKS OR CURBS:

Concrete sidewalks or curbs shall be saw cut to the nearest score marks and replaced equal in dimension to that removed with score marks matching existing sidewalk or curb.

UG 23. SPOILS:

No earth or construction materials shall be dragged or scraped across the highway pavement, and no excavated earth shall be placed or allowed to remain at a location where it may be tracked on the highway traveled way, or any public or private approach by the permittee's construction equipment, or by traffic entering or leaving the highway traveled way. Any excavated earth or mud so tracked onto the highway pavement or public or private approach shall be immediately removed by the permittee.